RADIOLOGICAL EMERGENCY PREPAREDNESS

EXERCISE EVALUATION REPORT

FACILITY: ARTIFICIAL ISLAND GENERATING STATION
(Consisting of Salem and Hope Creek Reactors)

OPERATOR: Public Service Electric & Gas Company

LOCATION: Lower Alloways Township, Salem County, New Jersey

REPORT DATE: June 13, 1989

EXERCISE DATE: November 29, 1988

PARTICIPATING JURISDICTIONS: State of Delaware
Counties of Kent and New Castle

NON-PARTICIPATING JURISDICTIONS: None

REPORT PREPARED BY: Federal Emergency Management Agency

and Regional Assistance Committee

Region III

Philadelphia, Pennsylvania

Prepared in accordance with 44 CFR 350; and NUREG-0654/FEMA-REP-1, Revision 1, of November 1980.

EXECUTIVE SUMMARY

This report is the post-exercise evaluation of the joint, biennial Radiological Emergency Preparedness Exercise for the Artificial Island Generating Station conducted on November 29, 1988. The report has been prepared in accordance with 44 CFR 350, NUREG-0654,REP-1,Rev-1, and FEMA Guidance Memorandum EX-3 (2/26/88). Exercise participants evaluated by this report include the State of Delaware and the counties of Kent and New Castle.

FEMA evaluators assessed the exercise participants. Performance of the participants is summarized in terms of three categories:

A. Deficiencies: none were identified.
B. Areas Requiring Corrective Action: six were identified.
C. Areas Recommended for Improvement: seven were identified.

Deficiencies are required to be promptly corrected through remedial actions. Areas Requiring Corrective Action are required to be corrected during the next biennial exercise. Areas Recommended for Improvement are advisory recommendations.

This exercise included some but not all FEMA evaluation objectives for radiological emergency preparedness exercises. All applicable objectives must be met within a six year cycle. Section II of this report includes the status of this evaluation cycle.

Three problem areas identified from previous exercises were corrected in this exercise. Three other problem areas are expected to be addressed at the next biennial exercise.

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I. INTRODUCTION

A. BACKGROUND

Federal regulations require that periodic Radiological Emergency Preparedness exercises be conducted in support of commercial nuclear power plants to evaluate both onsite and offsite emergency preparedness capabilities. The Federal Emergency Management Agency is responsible for evaluating offsite emergency preparedness, as demonstrated during the exercises by the affected state and local governments, volunteer agencies and other private organizations with designated response duties. The exercises use simulated onsite nuclear power problems to cause the affected State and local governments to respond to an offsite emergency. These periodic exercises are intended to test: 1) the integrated capability of public and private agencies and organizations to respond; and 2) the basic elements existing within the offsite emergency preparedness plans and procedures. The exercises demonstrate a coordinated response by State and local authorities to mobilize sufficient personnel and resources to protect the health and safety of the public. The exercise scenarios are designed to warrant the implementation of protective actions for the public up to and including evacuation. This was the sixth full participation exercise for the operator of the Artificial Island Generating Station (consisting of Salem and Hope Creek Reactors) and the various State, local, and volunteer offsite response organizations in Delaware.

The purpose of this report is to record the capabilities of State and local governments to respond to an accident at the Artificial Island Generating Station based upon the actual demonstration or simulation of their abilities during the November 29, 1988 joint, full participation exercise. This report identifies strengths and weaknesses in preparedness and response capabilities, and recommends corrective actions which, if implemented, will help to improve preparedness and response capabilities. This report does not include an evaluation of New Jersey State and local jurisdictions, as their capabilities are evaluated and reported on separately by FEMA Region II.

The exercise was evaluated by a team comprised of individuals from FEMA Region III, along with representatives of the Regional Assistance Committee agencies, Argonne National Laboratory, and the American Red Cross.

B. EVALUATION CRITERIA USED

Federal evaluation criteria for this exercise consisted of the planning standards and procedures in the following document:

NUREG-0654/FEMA-REP-1, REV. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants", November 1980.

C. EMERGENCY PLANS

The State and local governments participating in the 1988 Artificial Island Exercise were evaluated in terms of their ability to respond to an incident as prescribed by their emergency plans. The following radiological emergency response plans, prepared pursuant to NUREG-0654/FEMA REP-1, Rev.1, were in effect for the exercise:

The Delaware Radiological Emergency Response Plan, with revisions through July 1987, including volumes for the State Plan, New Castle and Kent County Plans, Implementing Procedures, Standard Operating Procedures, and Attachments.

The Delaware plans were prepared under the State authority of Section 3112, Title 20, Delaware Code Annotated.

II. OBJECTIVES

A. POTENTIAL OBJECTIVES.

The Artificial Island Exercise Objectives are derived from a list of 37 potential objectives. The objectives are selected based upon the plant's off-site emergency preparedness requirements for this particular exercise. Not all 37 objectives are tested during each exercise. However, all applicable objectives should be met within a six-year cycle.

B. SELECTED OBJECTIVES.

The following is the complete list of objectives; the objectives selected for demonstration during this exercise are indicated by asterisks. Objectives are classified in three groups. Within each group, there are sub-groups of related objectives. Each objective is cross-indexed to NUREG-0654/ FEMA-REP-1, Rev. 1, Planning Standards and Evaluation Criteria. Group A objectives, numbers 1-15, are core objectives that are to be demonstrated in each biennial exercise. Group B objectives are scenario-dependent; they may not all be demonstrated during any given exercise. Group C objectives are in a category which must be demonstrated at least once every six years.

OBJECTIVE NUMBER	NUREG-0654/ FEMA-REP-1

GROUP A - CORE OBJECTIVES THAT ARE SCENARIO INDEPENDENT

EMERGENCY CLASSIFICATION LEVELS

*1.	Demonstrate the ability to monitor, understand and use emergency classification levels (ECL) through the appropriate implementation of emergency functions and activities corresponding to ECL's as required by the scenario. The four ECL's are: Notification of unusual event, alert, site area emergency and general emergency.	D.3 D.4

MOBILIZATION OF EMERGENCY PERSONNEL

*2.	Demonstrate the ability to fully alert, mobilize and activate personnel for both facility and field-based emergency functions.	E.1 E.4

DIRECTION AND CONTROL

*3.	Demonstrate the ability to direct, coordinate and control emergency activities.	A.1.d A.2.a

COMMUNICATIONS

*4.	Demonstrate the ability to communicate with all appropriate locations, organizations and field personnel.	F.

FACILITIES EQUIPMENT AND DISPLAYS

*5.	Demonstrate the adequacy of facilities, equipment, displays and other materials to support emergency operations.	G.3.a, H.2, 3

EMERGENCY WORKER EXPOSURE CONTROL

*6.	Demonstrate the ability to continuously monitor and control emergency worker exposure.	K.3

FIELD RADIOLOGICAL MONITORING

*7.	Demonstrate the appropriate equipment and procedures for determining field radiation measurement.	I.8,11
*8.	Demonstrate the appropriate equipment and procedures for the measurement of airborne radioiodine concentrations as low as 10 to -7 microcurie per cc in the presence of noble gases.	I.9
*9.	Demonstrate the ability to obtain samples of particulate activity in the airborne plume and promptly perform laboratory analyses.	I.10

PLUME DOSE PROJECTION

*10.	Demonstrate the ability, within the plume exposure pathway, to project dosage to the public via plume exposure, based on plant and field data.	I.10

PLUME PROTECTIVE ACTION DECISIONMAKING

*11.	Demonstrate the ability to make appropriate protective action decisions, based on projected or actual dosage, EPA PAG's, availability of adequate shelter, evacuation time estimates and other relevant factors.	J.10.m

ALERT, NOTIFICATION AND EMERGENCY INFORMATION

*12.	Demonstrate the ability to initially alert the public within the 10-mile EPZ and begin dissemination of an instructional message within 15 minutes of a decision by appropriate State and/or local official(s).	E.6

*13. Demonstrate the ability to coordinate the formulation and dissemination of accurate information and instructions to the public in a timely fashion after the initial alert and notification has occurred.	E.5, G.4.b
*14. Demonstrate the ability to brief the media in an accurate, coordinated and timely manner.	G.3.a, G.4.a
*15. Demonstrate the ability to establish and operate rumor control in a coordinated and timely fashion.	G.4.c

GROUP B - SCENARIO-DEPENDENT OBJECTIVES

USE OF POTASSIUM IODIDE (KI)

16. Demonstrate the ability to make the decision to recommend the use of KI to emergency workers and institutionalized persons, based on predetermined criteria, as well as to distribute and administer it once the decision is made, if necessitated by radioiodine releases.	J.10.e,f
17. Demonstrate the ability to make the decision, if the State plan so specifies, to recommend the use of KI to emergency workers and institutionalized persons, based on predetermined criteria, as well as to distribute and administer it once the decision is made, if necessitated by radioiodine releases.	J.10.f

IMPLEMENTATION OF PROTECTIVE ACTIONS

18. Demonstrate the ability and resources necessary to implement appropriate protective actions for the impacted permanent and transient plume EPZ population (including transit-dependent persons, special needs populations, handicapped persons and institutionalized persons).	J.9, J.10.d,g
19. Demonstrate the ability and resources necessary to implement appropriate protective actions for school children within the plume EPZ.	J.9, J.10.g

TRAFFIC CONTROL

20. Demonstrate the organizational ability and resources necessary to control evacuation traffic flow and to control access to evacuated and sheltered areas.	J.10.j,k

RELOCATION CENTERS (REGISTRATION, MONITORING, CONGREGATE CARE AND DECONTAMINATION)

21.	Demonstrate the adequacy of procedures, facilities, equipment and personnel for the registration, radiological monitoring and decontamination of evacuees.	J.12
22.	Demonstrate the adequacy of facilities, equipment and personnel for congregate care of evacuees.	J.10.h

MEDICAL SERVICES (TRANSPORTATION AND FACILITIES)

*23.	Demonstrate the adequacy of vehicles, equipment, procedures and personnel for transporting contaminated, injured or exposed individuals.	L.4
*24.	Demonstrate the adequacy of medical facilities, equipment, procedures and personnel for handling contaminated, injured or exposed individuals.	L.1

DECONTAMINATION

25.	Demonstrate the adequacy of facilities, equipment supplies, procedures and personnel for decontamination of emergency workers, equipment and vehicles and for waste disposal.	K.5.a,b

GROUP C - OTHER OBJECTIVES: TO BE DEMONSTRATED AT LEAST ONCE EVERY SIX YEARS

SUPPLEMENTARY ASSISTANCE (FEDERAL/OTHER)

26.	Demonstrate the ability to identify the need for and call upon Federal and other outside support agencies' assistance.	C.1.a,b

INGESTION EXPOSURE PATHWAY

27.	Demonstrate the appropriate use of equipment and procedures for collection and transport of samples of vegetation, food crops, milk, meat, poultry, water and animal feeds (indigenous to the area and stored).	I.8, J.11
28.	Demonstrate the appropriate lab operations and procedures for measuring and analyzing samples of vegetation, food crops, milk, meat, poultry, water and animal feeds (indigenous to the area and stored).	C.3, J.11

29.	Demonstrate the ability to project dosage to the public for ingestion pathway exposure and determine appropriate protective measures based on field data, FDA PAG;s and other relevant factors.	I.10, J.9, J.11
30.	Demonstrate the ability to implement both preventive and emergency protective actions for ingestion pathway hazards.	J.9, J.11

RECOVERY, REENTRY AND RELOCATION

31.	Demonstrate the ability to estimate total population exposure.	M.4
32.	Demonstrate the ability to determine appropriate measures for controlled reentry and recovery based on estimated total population exposure, available EPA PAG's and other relevant factors.	M.1
33.	Demonstrate the ability to implement appropriate measures for controlled reentry and recovery.	M.1

MOBILIZATION OF EMERGENCY PERSONNEL (24-HOUR, CONTINUOUS BASIS)

34.	Demonstrate the ability to maintain staffing on a continuous 24-hour basis by an actual shift change	A.1.e, A.4

EVACUATION OF ONSITE PERSONNEL

35.	Demonstrate the ability to coordinate the evacuation of onsite personnel.	B.6, J.2

UNANNOUNCED AND OFF-HOURS

36.	Demonstrate the ability to carry out emergency response functions (i.e. activate EOC's, mobilize staff that report to the EOC's, establish communications linkages and complete telephone call down) during an unannounced off-hours drill or exercise.	N.1.b

UTILITY OFFSITE RESPONSE ORGANIZATIONS

37.	Demonstrate the capability of utility offsite response organization personnel to interface with non-participating State and local governments through their mobilization and provision of advice and assistance.	C.5, N.1.b

C. OBJECTIVES NOT ACHIEVED.

The following Objective was not adequately demonstrated during this exercise. The Medical Services evaluation in Section IV of this report provides an explanation. The problem is also included in the Summary List of Issues, under the indicated Problem ID number.

Location/Activity	Objective not Achieved	Problem ID
Medical Services	6	AI88X-2R

ARTIFICIAL ISLAND 1988 EXERCISE
GM EX-3 OBJECTIVES EVALUATED

Site/Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	UN	AH
Delaware State Emergency Operations Center	Y	Y	Y	Y	Y	Y					Y	Y	Y																						
Accident Assessment	Y	Y	Y							Y	Y																								
Emergency Operations Facility	Y	Y		Y	Y	Y																													
State News Center	Y	Y	Y	Y	Y									Y	Y																				
Joint Information Center	Y	Y	Y	Y	Y	Y								Y																					
Field Air Sampling Teams		Y		Y		Y	Y	Y	Y																										
Medical Services				Y		N																Y	Y												
Kent County Emergency Operations Center	Y	Y	Y	Y	Y																														
New Castle County Emergency Operations Center	Y	Y	Y	Y	Y																														

NOTES: Met Objective: Y = Yes; N = No Objective 17 not applicable to Region III Objective 36: UN = Unannounced Exercise; AH = After Hours Exercise

III. EXERCISE SCENARIO AND CHRONOLOGY

A. SCENARIO

Unit 2 was at 100% power, with several pumps out of service for maintenance and repair. Due to Reactor Coolant System (RCS) activity discovered two days earlier, increased fuel leakage was suspected. An equipment operator was investigating inside Unit 2 containment. Upon receipt at 1530 hours of the latest sample results, which indicated that RCS activity had not decreased, the unit was shut down, as required, and an Unusual Event was declared.

Shortly thereafter, a reactor coolant pump seized, resulting in a reactor trip. Increased fuel damage occurred due to mechanical damage caused by skewed control rods. An Alert was declared. The operator inside containment, while exiting, was injured, and the licensee's fire department was called to provide first aid.

In attempting to effect a cold shutdown, the operators experienced several equipment problems in applying boron to the reactor coolant system, and repair teams were dispatched to correct the problems.

A news helicopter experienced engine failure and crashed in the vicinity of Unit 2, damaging the plant structure. This prompted the declaration of a Site Area Emergency. The licensee's fire department provided first aid to the two occupants.

The operators commenced the cooldown procedure after confirming that the boron concentration was adequate. During the process, a large break Loss of Coolant Accident occurred. Because of the pre-existing fuel damage, a General Emergency was declared. A hydrogen explosion inside containment damaged the containment spray piping outside containment. The cracked piping acted as a duct, venting containment atmosphere to the Auxiliary Building. Mechanical repairs allowed for core-cooling to be re-established within twenty minutes, preventing further core damage.

The release, which was a function of the difference in pressure between the containment and Auxiliary Building, slowly diminished as the containment temperature decreased, and ended when the pressure within the two structures equalized.

B. CHRONOLOGY OF EVENTS

Projected Time		Actual Time
1530-1545	Unusual Event declaration	1538
1600-1620	Alert declaration	1602
1750-1805	Site Area Emergency declaration	1806
2005-2025	General Emergency declaration	2013
2400	Exercise terminates	0028

IV. EXERCISE RESULTS

A. PARTICIPANT EVALUATIONS

DELAWARE STATE EMERGENCY OPERATIONS CENTER (EOC)

Objective 1, the ability to monitor, understand and use Emergency Classification Levels (ECLs), was adequately demonstrated. It is recommended that the status board entry for an ECL include the time that the ECL was received in the EOC in addition to the time that the classification was declared by the utility.

Objective 2, the ability to fully alert, mobilize and activate personnel for both EOC and field locations, was adequately demonstrated.

Objective 3, the ability to direct, coordinate and control emergency activities, was very well demonstrated. The DEPO Acting Director demonstrated effective and timely decision-making, in consultation with appropriate agency officials. The Operations Officer performed his coordination responsibilities expertly, and the staff were kept fully informed via frequent briefings, comprehensive status and events boards, and an effective message system. The staff were very well prepared and performed their responsibilities thoroughly and with a minimum of simulation. The coordination by Delaware officials of their protective actions with New Jersey is considered adequate, but would have been more effective had the two directors discussed protective actions before making decisions.

Objective 4, the ability to communicate with all appropriate locations, organizations, and field personnel, was successfully demonstrated. The communications capabilities of the State EOC were exceptional, and include a full primary communications capability, as well as a back-up capability. The Communications Officer had installed an uninterrupted power system (UPS) to support the phone system should normal power fail. The redesign of the communications areas within the EOC improved operations by eliminating excess noise. The internal intercom system allowed each agency to follow proceedings within the EOC in a timely manner without overloading the main briefing room. The coordination between the EOC and EBS station was exceptional. The EBS was activated in accordance with the State plan. All participating agencies had a primary and alternate system for communicating with their personnel. All message traffic was logged and controlled by a message officer. The State EOC had two mobile communications centers available, should they be needed.

Objective 5, the facilities, equipment, displays and other materials to support emergency operations were demonstrated to be adequate.

Objective 6, the ability to continuously monitor and control emergency worker exposure, was demonstrated in an outstanding manner. Staff members received an in-depth briefing and appropriate equipment upon arrival at the EOC, and before departing for field assignments. Dosimeters were placed strategically throughout the EOC and read every thirty minutes. Records on equipment calibration and maintenance were meticulously kept. Upon their return to the EOC from the field, all emergency workers were correctly monitored using appropriate equipment. Decontamination procedures and equipment were explained. The Radiological Officer demonstrated commendable attention to detail.

Objective 11, the ability to make appropriate protective action decisions, based on projected or actual dosage, EPA Protective Action Guides, availability of adequate shelter, evacuation time estimates and other relevant factors, was adequately demonstrated. Three phases of protective action decisions were made, reflecting changes in plant status. All decisions were made by the Acting Director, in consultation with the Accident Assessment Advisory Group (AAAG) and Operations Officer, in accordance with the plan. The decisions conformed to the AAAG recommendations, which in turn were based upon the utility's recommendations.

Objective 12, the ability to initially alert the public within the 10-mile EPZ and begin dissemination of an instructional message within 15 minutes of a decision by appropriate State officials, was adequately demonstrated. The initiating event was the Acting Director's decision for the first phase of protective actions. In accordance with his directions, the siren and EBS systems were properly activated, with the EBS test message beginning about 13 minutes after the decision time (the station had been placed on standby previously). Back-up route alerting was directed by the Fire Board in response to one siren failure. Activation of the special alerting method for the Delaware River and Bay, which uses helicopters and boats to warn mariners, boaters and fishermen on the open waters and tidal areas, was simulated. The agencies responsible demonstrated appropriate coordination throughout the exercise, in response to protective action changes.

Objective 13, the ability to coordinate the formulation and dissemination of accurate information and instructions to the public in a timely fashion, was adequately demonstrated.

ACCIDENT ASSESSMENT

Objective 1, the ability to monitor, understand and use emergency classification levels through the appropriate implementation of emergency functions and activities, was adequately demonstrated by the Accident Assessment Advisory Group (AAAG) staff.

Objective 2, the ability to fully alert, mobilize and activate personnel for both facility and field-based emergency functions, was adequately demonstrated.

Objective 3, the ability to direct, coordinate and control emergency activities, was adequately demonstrated. Decisions were appropriate based on the available information. There was an exceptionally smooth decision-making process which is apparently due to the selection of teams with compatible temperament. This is an innovative and productive approach.

Objective 10, the ability (within the plume exposure pathway) to project dosage to the public via plume exposure, based on plant data, was adequately demonstrated. Field data was never above zero and so was not usable for dose projection. The dose assessment teams were provided incorrect release data from the plant, but noticed the inconsistency and had the correct data provided immediately. There was a noticeable improvement in the dose assessment capability, as demonstrated in previous exercises. The staff were well-trained and well-prepared.

Objective 11, the ability to make appropriate protective action decisions, based on projected or actual dosage, EPA Protective Action Guides, availability of adequate shelter, evacuation time estimates and other relevant factors, was adequately demonstrated. The AAAG's protective action recommendations were promptly forwarded to the Acting Director, who made the final decisions. The AAAG updated their recommendations in response to plant status changes, as appropriate.

EMERGENCY OPERATIONS FACILITY

Objective 1, the ability to monitor, understand and use Emergency Classification Levels (ECLs) through the appropriate implementation of emergency functions and activities corresponding to ECLs as required by the scenario, was adequately demonstrated.

Objective 2, the ability to fully alert, mobilize and activate personnel for both facility and field-based emergency functions, was adequately demonstrated. Two Delaware EOF representatives responded promptly.

Objective 4, the ability to communicate with all appropriate locations, organizations, and field personnel, was adequately demonstrated. The EOF had ample primary and backup communications systems, which operated without problems.

Objective 5, the adequacy of facilities, equipment, displays and other materials to support emergency operations was demonstrated.

Objective 6, the ability to continuously monitor and control emergency worker exposure, was adequately demonstrated.

STATE NEWS CENTER

Objective 1, the ability to monitor, understand and use emergency classification levels, was adequately demonstrated.

Objective 2, the ability to fully alert, mobilize and activate personnel, was adequately demonstrated. All positions were staffed.

Objective 3, the ability to direct, coordinate and control emergency activities, was adequately demonstrated. The Public Information Officer (PIO) demonstrated effective leadership and kept the staff informed through briefings. Staff members were well-trained and knowledgeable of their responsibilities. The procedures, as specified in the plan, were followed throughout the exercise.

Objective 4, the ability to communicate with all appropriate locations, organizations and field personnel, was adequately demonstrated. Both primary and backup communications systems were demonstrated. Problems were experienced with the primary telefax machine in receiving transmissions from the State EOC, but backup systems were successfully substituted. At first, the PIO contacted the EOC by telephone during this period and tape recorded the information. Later, hardcopy transmissions were sent via the backup telefax machine. Procedures demonstrated during the exercise were quite commendable.

Objective 5, the adequacy of facilities, equipment, displays and other materials to support emergency operations, was demonstrated. The spacious, fully equipped News Center at the Carvel Building was an excellent facility.

Objective 14, the ability to brief the media in an accurate, coordinated and timely manner, was adequately demonstrated. Press packages were prepared and ready for distribution, and contained both accurate and informative media materials. Press releases and fact summary sheets were prepared and ready for distribution. The staff maintained close contact with the decision makers at the State EOC.

Objective 15, the ability to establish and operate rumor control in a coordinated and timely fashion, was adequately demonstrated. The rumor control section was staffed by DelMarva Power and Light personnel, who operated in a professional and effective manner. The rumor control telephone number was well publicized.

JOINT INFORMATION CENTER

Objective 1, the ability to monitor, understand and use emergency classification levels, was adequately demonstrated. Displaying the classification levels on a status board, in the staff work area and in the briefing room, would be beneficial.

Objective 2, the ability to fully alert, mobilize and activate personnel, was adequately demonstrated. The Delaware public information staff responded promptly and in accordance with the plan.

Objective 3, the ability to direct, coordinate and control emergency activities, was adequately demonstrated. The Public Information Officer and staff demonstrated the capability to coordinate effectively with the New Jersey and utility spokespersons, and with the decision makers at the Delaware EOC.

Objective 4, the ability to communicate with all appropriate locations, organizations and field personnel, was adequately demonstrated. Suitable primary and backup communications systems were available for use by the Delaware representatives.

Objective 5, the adequacy of facilities, equipment, displays and other materials to support emergency operations, was adequately demonstrated. It is recommended that visual displays include status boards located in the work area and the media briefing room, and maps for the media briefing room.

Objective 6, the ability to continuously monitor and control emergency worker exposure, was adequately demonstrated. As the JIC was located within the 10-mile EPZ, the Delaware staff had the appropriate dosimetry and related equipment, and were knowledgeable of exposure control procedures. Should evacuation of the JIC be necessary, the operations would be relocated to a facility in Glassboro.

Objective 14, the ability to brief the media in an accurate, coordinated and timely manner, was adequately demonstrated. The Delaware PIO participated in the six joint briefings of the media, and provided hard copy of Delaware's press releases. It is recommended that a representative from the Health Department be available to answer any possible health-related questions.

FIELD AIR SAMPLING TEAMS

Objective 2, the ability to fully alert, mobilize and activate personnel for both facility and field-based emergency functions, was adequately demonstrated. Two teams demonstrated the capability for timely activation and deployment.

Objective 4, the ability to communicate with all appropriate locations, organizations, and field personnel, was adequately demonstrated. The teams had both primary and backup radios. No receiving or transmitting difficulties were noted.

Objective 6, the ability to continuously monitor and control emergency worker exposure, was adequately demonstrated. The team members had the appropriate equipment, and were thoroughly familiar with exposure control procedures.

Objective 7, the appropriate equipment and procedures for determining field radiation measurements, was adequately demonstrated. The Blue and Red Field Teams had the proper equipment and demonstrated the procedures as designated in the SOP. The teams checked the equipment trunks prior to departure. One of the backup monitoring instruments had an expired calibration sticker.

Objective 8, the appropriate equipment and procedures for the measurement of airborne radioiodine concentrations as low as 10 to the minus 7 (.0000001) microcuries per cubic centimeter in the presence of noble gases, was adequately demonstrated. Each field team had an air sampler and other equipment as identified in the plan equipment checklist, including silver zeolite cartridges. Samples were properly collected, bagged and labeled in accordance with the SOP. The instrument used to count the charcoal filter cartridge did not have a calibration sticker. It is recommended that the teams be provided with equipment for removing the paper from the particulate filter, and for cleaning a contaminated fixture (cartridge holder).

Objective 9, the ability to obtain samples of particulate activity in the airborne plume and promptly perform laboratory analyses, was adequately demonstrated. The Blue Field team reported to the Emergency Worker Decontamination Station in Middletown and turned over samples to the Civil Air Patrol team which delivered the samples to the laboratory via air transport.

MEDICAL SERVICES

Objective 4, the ability to communicate with all appropriate locations, organizations, and field personnel, was adequately demonstrated.

Objective 6, the ability to continuously monitor and control emergency worker exposure, was not adequately demonstrated during the exercise. Additional training is needed for the ambulance crew regarding permissible radiation doses. The plan specifies 150 mR/day as the exposure limit, but the crew quoted 100 R/day as the authorized limit.

Objective 23, vehicles, equipment, procedures and personnel for transporting contaminated, injured or exposed individuals, was adequately demonstrated, although several equipment and procedural problems were noted. The ambulance crew performed thorough patient monitoring, but two aspects of the procedure were not properly demonstrated. The CDV-700 survey meter and probe was used without the protective plastic covering specified in SOP 402; the patient monitoring data was written on the sheet used to wrap the patient instead of on the appropriate form identified in SOP 408. Furthermore, the CDV-700 survey instrument used by the ambulance crew did not have a calibration sticker. The ambulance floor was only partially covered.

Objective 24, the medical facility's equipment, procedures and personnel for handling contaminated, injured or exposed individuals, was adequately demonstrated. The staff performed proper monitoring of the patient, but the monitoring instrument and probe were not protected from contamination by plastic wrap, as called for in SOP 402. Preparations and procedures for preventing the spread of contamination within the emergency room were excellent, but there were no doors on the entrance to the emergency room where the patient was treated, which could allow for the spread of airborne contamination. Decontamination procedures were properly performed.

NEW CASTLE COUNTY EOC

Objective 1, the ability to monitor, understand and use Emergency Classification Levels (ECL) through the appropriate implementation of emergency functions and activities corresponding to ECLs as required by the exercise scenario, was adequately demonstrated.

Objective 2, the ability to fully alert, mobilize and activate personnel for both facility and field-based emergency functions, was adequately demonstrated. Two EOC staff roles were performed by alternate personnel: the EOC Director (filled by the Emergency Planning Coordinator of the New Castle County Department of Public Safety) and the EOC Police Director (filled by a police captain). These substitutions, which are in compliance with the provisions of the county plan, did not negatively impact EOC emergency operations during the exercise.

Objective 3, the ability to direct, coordinate and control emergency activities, was adequately demonstrated. The efforts and actions taken to manage County REP operations during the exercise on part of the EOC Director and staff were outstanding. The EOC Director provided frequent and thorough briefings for the staff, including realistic resource assessment and discussion on hypothetical incident responses (anticipating likely developments). Preparations for County assistance in the evacuation of special needs populations were exhaustive. The EOC staff closely monitored State actions within the County area. Throughout the exercise, the EOC staff was kept abreast of the status of evacuations of New Castle County residents, and the mobilization and operation of registration centers and shelters. An exceptional control measure employed during the exercise was a status board used to track the allocation of personnel and resources of each emergency response organization represented in the EOC.

Objective 4, the ability to communicate with all appropriate locations, organizations, and field personnel, was adequately demonstrated.

Objective 5, facilities, equipment, displays, and other materials, were adequate to support emergency operations.

KENT COUNTY EOC

Objective 1, the ability to monitor, understand and use emergency classification levels, was adequately demonstrated.

Objective 2, the ability to fully alert, mobilize and activate personnel for both EOC and field locations, was adequately demonstrated.

Objective 3, the ability to direct, coordinate and control emergency activities, was adequately demonstrated. The Emergency Planning and Operations Director demonstrated effective management of EOC operations, and the EOC staff were well-trained and knowledgeable of their responsibilities. The County liaison assigned to the State EOC reported erroneous times to the County EOC regarding the Site Area Emergency declaration and the siren activation.

Objective 4, the ability to communicate with all appropriate locations, organizations and field personnel, was demonstrated in an outstanding manner. The primary and backup communications capabilities within this county were exceptional. The amateur radio personnel were well trained on their systems. The AIGS hotline has been wired to each console in the County Communications Room, thus ensuring it will receive prompt response. The Director has installed a 200 channel scanner in the EOC which allows him the capability of monitoring all his radio nets. One of the County radio net's four channels is dedicated to emergency management, which links the EOC to all County emergency vehicles.

Objective 5, facilities, equipment, displays and other materials, were adequate to support emergency operations.

B. STATUS OF PREVIOUS INADEQUACIES

The following previous inadequacies were identified at the last Artificial Island exercise, conducted September 9, 1987. All were classified as Areas Requiring Corrective Action. Each item is followed by a discussion of findings, as demonstrated during the November 29, 1988 exercise, and a determination of present status.

1. DEFICIENCIES

There were no Deficiencies identified during the 1987 exercise.

2. AREAS REQUIRING CORRECTIVE ACTION

There were six Areas Requiring Corrective Action identified in the 1987 exercise.

State EOC

AIX87-1R

The surveys for radiological contamination of individuals entering the State EOC were not sufficiently thorough. A radioactive source concealed on an evaluator was not detected. The surveys should be performed more thoroughly. It is further recommended that a more sensitive probe be used.

FINDING (November 29, 1988 exercise):

The Radiological Monitor at the State EOC demonstrated proper techniques, and used appropriate equipment, including a more sensitive probe.

STATUS: Resolved.

AIX87-2R

Several news releases and summary fact sheets prepared at the State EOC and transmitted to the Media Center had incorrect times for the declaration of General Emergency. The utility upgraded the incident to General Emergency at 1110. However, the State EOC information designated 1229 as the time General Emergency was declared. The press release preparation procedures should be amended, such as by adding a proof-reading step, to minimize such errors.

FINDING (November 29, 1988 exercise):

The Acting Director proofread and authorized all press releases prior to their transmittal by the Public

Information Officer. The declaration times for the emergency classifications were correctly reported.

STATUS: Resolved.

Accident Assessment

AIX87-3R

There was no demonstration of the correct calculation of ground deposition or ingestion based on the scenario release. This is a relatively difficult calculation which has been implemented on the dose assessment computer. However, the AAAG staff were not adequately familiar with the computer program to calculate the doses. The AAAG staff should become thoroughly familiar with the use of the dose assessment computer program for calculating doses from ground deposition and ingestion. Future exercises should include calculation of such doses for use in reentry/recovery recommendations.

FINDING (November 29, 1988 exercise):

As agreed to by FEMA Region III prior to the exercise, this Inadequacy was not addressed under the terms of the Objectives and Scenario for this exercise.

STATUS:

Deferred until 1990 exercise.

State Media Center

AIX87-4R

SOP 502 was revised on July 1, 1987. The revisions were not submitted to FEMA prior to the exercise, although the revision substantially changed the Public Information procedures. State officials should submit such plan changes, which are intended to be demonstrated during an exercise, in sufficient time to permit a review by FEMA and the Regional Assistance Committee members.

FINDING (November 29, 1988 exercise):

DEPO submitted the revised SOP 502 in April 1988, with adequate time for FEMA review.

STATUS: Resolved.

Traffic/Access Control

AIX87-5R

The troopers manning access/traffic control posts were not familiar with methods to maximize their own protection while working in a potentially contaminated area. Future training should address the value of protective clothing and staying inside their closed vehicles whenever possible. The troopers were also unaware of what levels of exposure are considered hazardous.

FINDING (November 29, 1988 exercise):

As agreed to by FEMA Region III prior to the exercise, this Inadequacy was not addressed under the terms of the Objectives for this exercise.

STATUS:

Deferred until 1990 exercise.

Shellfish Sampling Team

AIX87-6R

The truck used by the (shell fish) sampling team was not equipped with a radio or any form of communication. As specified in SOP 303, vehicles used by shellfish sampling teams should include radios.

FINDING (November 29, 1988 exercise):

Per agreement, this Inadequacy was not addressed under the terms of the Objectives for this exercise.

STATUS:

Deferred until 1990 exercise.

V. SUMMARY LIST OF ISSUES

A. EXPLANATION OF CATEGORIES

FEMA has classified the problems listed for each evaluated location or activity according to the following three categories:

A. Deficiencies are demonstrated and observed inadequacies that cause a finding that offsite emergency preparedness is not adequate to provide reasonable assurance that appropriate protective measures can be taken to protect the health and safety of the public living in the vicinity of a nuclear power facility in the event of a radiological emergency. Because of the potential effect of deficiencies on emergency preparedness, they are to be promptly corrected through appropriate remedial actions, including remedial exercises, drills, or other actions. No Deficiencies were identified during this exercise.

B. Areas Requiring Corrective Actions are demonstrated and observed inadequacies of State and local government performance. Although their correction is required before the next scheduled biennial exercise, they are not considered, in and of themselves, to adversely affect public health and safety. Six Areas Requiring Corrective Action were identified during this exercise.

C. Areas Recommended for Improvement are problem areas observed during an exercise that are not considered to adversely affect public health and safety. Correction of these, although not required, would enhance an organization's level of emergency preparedness. Seven Areas Recommended for Improvement were identified during this exercise.

B. FINDINGS

The following Summary List of Issues is organized in accordance with the three categories described above. The listings show: 1) an identification number; 2) the location or activity where the problem was identified; 3) correlation with NUREG 0654/FEMA REP. 1, Rev. 1 planning standards and evaluation criteria; 4) a proposed correction date for the problem (to be provided by the State); and 5) a confirmed correction date. Each item includes a description of the issue and a recommendation for its correction or improvement. For Areas Requiring Corrective Action, space is provided for the State response to the identified problem

AREA REQUIRING CORRECTIVE ACTION

Problem ID	Location/ Activity	NUREG Element	Proposed Correction Date	Confirmed Correction Date
AIX88-1R	Field Air Sampling Teams	I.8	June 1989	

One backup monitoring instrument issued to the Red Team had an expired calibration sticker (CD-700, S/N 07466, due 3/88); the instrument used to count the cartridge (Canberra Series 10) did not have a calibration sticker. All field team instruments should be calibrated, if necessary, and calibration stickers should be affixed. (Objective 7)

State Response:

The Division of Air and Waste Management (Red and Blue Teams) has removed all civil defense survey meters from their response kits due to the difficulty in scheduling calibration for the CDV-700. The CDV-700 mentioned above has been replaced with an Eberline 140 which is calibrated every six months.

The Canberra Series cartridge was calibrated on June 5, 1989. The technician has experienced problems with the calibration stickers not adhering permanently and is correcting the problem. Attachment 1 is a copy of Canberra cartridge calibrations records for this period.

Correction of this ARCA will be demonstrated during the 1990 Ingestion Pathway Exercise.

AREA REQUIRING CORRECTIVE ACTION

Problem ID	Location/Activity	NUREG Element	Proposed Correction Date	Confirmed Correction Date
AIX88-2R	Medical Services-Ambulance	L.1	1989 MS-1 Exercise	

The ambulance crew were not knowledgeable of the authorized radiation exposure limit. The plan specifies 150 mR/day as the exposure limit, but the crew quoted 100 R/day as the authorized limit. The ambulance crew should receive further training regarding radiation exposure. (Obj. 6)

State Response:

The New Castle County Ambulance Division will receive additional training during 1989-90. This ARCA will be demonstrated during the 1989 annual medical exercise required by Guidance Memorandum MS-1.

AREA REQUIRING CORRECTIVE ACTION

Problem ID	Location/Activity	NUREG Element	Proposed Correction Date	Confirmed Correction Date
AIX88-3R	Medical Services-Ambulance	L.4	1989 MS-1 Exercise	

The CDV-700 survey instrument used by the ambulance crew (s/n 70201) did not have a calibration sticker. The instrument should be calibrated, if necessary, and a calibration sticker should be affixed. (Objective 23)

State Response:

All instruments will have calibration stickers affixed to them. This ARCA will be demonstrated during the 1989 annual medical exercise

AREA REQUIRING CORRECTIVE ACTION

Problem ID	Location/Activity	NUREG Element	Proposed Correction Date	Confirmed Correction Date
AIX88-4R	Medical Services-ambulance	L.4	1989 MS-1 Exercise	

The ambulance crew did not properly demonstrate two aspects of the patient monitoring procedure. The CDV-700 survey meter and probe was used without the protective plastic covering specified in SOP 402; the patient monitoring data was written on the sheet used to wrap the patient instead of on the appropriate form identified in SOP 408. The personnel monitoring procedures specified in SOP 402 and 408 should be followed, including use of protective plastic covering for the meter and probe, and use of the patient data form. (Objective 23)

State Response:

Ambulance personnel will receive additional training specifically noting to cover the radiation survey meter's probe with plastic and use appropriate forms to record patient information. New procedures are being drafted specifically for ambulance personnel. This ARCA will be demonstrated during the 1989 annual medical exercise required by Guidance Memorandum MS-1.

AREA REQUIRING CORRECTIVE ACTION

Problem ID	Location/Activity	NUREG Element	Proposed Correction Date	Confirmed Correction Date
AIX88-5R	Medical Services-Hospital	L.1	1989 MS-1 Exercise	

The monitoring instrument and probe used for monitoring the patient were not protected from contamination by plastic wrap, as called for in SOP 402. The personnel monitoring procedures specified in SOP 402 should be followed, including use of protective plastic covering for the meter and probe. (Objective 24)

State Response:

Hospital personnel neglected to cover the survey meter probe and will receive further training to do so. SOP 402 states that the probe should be covered in plastic not the meter. This ARCA will be demonstrated during the 1989 annual medical exercise required by Guidance Memorandum MS-1.

AREA REQUIRING CORRECTIVE ACTION

Problem ID	Location/Activity	NUREG Element	Proposed Correction Date	Confirmed Correction Date
AIX88-6R	Kent County EOC	E.1	'89 plan update	

The County liaison assigned to the State EOC reported erroneous times to the County EOC regarding the Site Area Emergency declaration and the siren activation. The notification procedure should assure that information is accurately reported, especially regarding protective actions, public alert and notification and Emergency Classification Level changes. A separate verification procedure, independent of the normal notification channel, should be considered for such messages. (Obj. 3)

State Response:

Notification procedures will be amended to include a verification step for critical information including event classification levels and protective action decisions. This plan change will be included in the 1989 plan update to FEMA and will be demonstrated during the 1990 ingestion pathway exercise.

AREA RECOMMENDED FOR IMPROVEMENT

Problem ID	Location/Activity	NUREG Element
AIX88-1I	Delaware State EOC	D.3

The times posted on the EOC status board for the Emergency Classification Levels (ECLs) were the times that the classification was declared by the utility; the entries did not indicate the time that each ECL was received in the EOC. It is recommended that the status board entry for an ECL include the time that the ECL was received in the EOC in addition to the time that the classification was declared by the utility. (Objective 3)

AREA RECOMMENDED FOR IMPROVEMENT

Problem ID	Location/Activity	NUREG Element
AIX88-2I	State EOC	A.2.a.

The DEPO Acting Director reported the protective action decisions for Delaware to the New Jersey director immediately after the decisions were made. The coordination by Delaware officials of their protective actions with New Jersey is considered adequate, but would have been more effective had the two directors discussed protective actions before making decisions. It is recommended that, whenever possible, officials of the two states discuss protective actions being considered before the final decisions are made. (Objective 3)

AREA RECOMMENDED FOR IMPROVEMENT

Problem ID	Location/Activity	NUREG Element
AIX88-3I	Joint Information Center	D.3.

Visual displays at the JIC could be improved. There were no status boards for displaying Emergency Classification Levels and other important information, and no maps depicting evacuation routes, mass care centers, and protective action areas. It is recommended that such visual aids be provided. (Objective 5)

AREA RECOMMENDED FOR IMPROVEMENT

Problem ID	Location/Activity	NUREG Element
AIX88-4I	Joint Information Center	G.4.a

There was no Health Department representative present to answer health-related questions. It is recommended that State officials consider providing a Health Department representative at the Joint Information Center during media briefings. (Objective 14)

AREA RECOMMENDED FOR IMPROVEMENT

Problem ID	Location/Activity	NUREG Element
AIX88-5I	Field Air Sampling Teams	I.8

The field air sampling procedure would benefit from additional equipment and supplies. The teams had no equipment to clean a contaminated fixture (cartridge holder), nor to remove paper from the particulate filter. It is recommended that the field air sampling teams be equipped with a pair of tweezers to remove particulate filters and some disposable handi-wipes to clean potentially contaminated fixtures. (Objective 8)

AREA RECOMMENDED FOR IMPROVEMENT

Problem ID	Location/Activity	NUREG Element
AIX88-6I	Medical Services- Ambulance	L.4.

The ambulance floor was only partially covered, and the covering was not secured. It is recommended that the procedure for transporting contaminated patients via ambulance include completely covering the floor of the ambulance, and securing the covering, to minimize possible contamination of the vehicle. (Objective 23)

AREA RECOMMENDED FOR IMPROVEMENT

Problem ID	Location/Activity	NUREG Element
AIX88-7I	Medical Services-Hospital	L.1.

There were no doors on the entrance to the emergency room where the patient was treated. The open doorway could allow for the spread of airborne contamination. It is recommended that emergency room anti-contamination preparations include draping the doorway. (Objective 24)

APPENDIX A. EXERCISE PARTICIPANTS

State

Division of Emergency Planning and Operations (DEPO).
State Departments:

- Agriculture
- Fish and Wildlife/Delaware Marine Police
- Health and Social Services
- Highways
- National Guard
- Natural Resources and Environmental Control
- Parks and Recreation
- Public Health
- Public Instruction
- Purchasing
- State Fire School
- State Police
- Transportation Authority

Local

New Castle County Department of Public Works and other County Agencies and Organizations with a designated response role.

Kent County Emergency Planning and Operations and other County Agencies and Organizations with a designated response role.

Other Participants

- American Red Cross
- Civil Air Patrol
- Radio Amateur Civil Emergency Services
- Salvation Army
- U.S. Army Corps of Engineers
- U.S. Coast Guard

There were no non-participating jurisdictions.

APPENDIX B. EVALUATOR ASSIGNMENTS

Joseph M. McCarey (FEMA) Chairman, Regional Assistance Committee	Observer-at-Large
Stephen Hopkins (FEMA) Project Officer	Delaware EOC
Janet Lamb (FEMA)	Delaware EOC
Peter Weber (FEMA)	Delaware EOC
William Belanger (EPA)	Accident Assessment
Raymond Douglas (FEMA)	State News Center
Hugh Laine (FEMA)	Joint Information Center
Scott Fina (FEMA)	New Castle County EOC
Craig Pattani (FEMA)	Kent County EOC
Fred Donnelly (FEMA)	Communications/EBS Station
Charles Amato (NRC)	Emergency Operations Facility
William Knoerzer (ANL)	Field Air Sampling Teams
Marty Simonin (ANL)	Medical Services